BIOLOGICAL OPINION

on the

APPLICATION FOR AN INCIDENTAL TAKE PERMIT FOR THE FEDERALLY ENDANGERED INDIANA BAT (*Myotis sodalis*) FOR THE SIX POINTS ROAD INTERCHANGE AND ASSOCIATED DEVELOPMENT

HENDRICKS AND MARION COUNTIES, INDIANA

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Habitat Conservation Plan for the Six Points Road Interchange and Associated Development (hereafter referred to as the HCP). The HCP was submitted by an Interagency Task Force, which includes the Indianapolis Airport Authority (IAA); Indianapolis Department of Public Works; Indianapolis Department of Metropolitan Development; the Hendricks County Board of County Commissioners; the Federal Highway Administration (FHWA); and the Indiana Department of Transportation (INDOT) (hereafter collectively referred to as the applicants), and its effects on the Federally endangered Indiana bat (*Myotis sodalis*). The HCP was submitted by the applicants as part of their application for a permit for incidental take of Indiana bats that will be associated with the construction of road improvements and associated development in the vicinity of the Indianapolis International Airport (IIA). This biological opinion is prepared in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

This biological opinion is the culmination of formal section 7 consultation under the Act. The purpose of formal section 7 consultation is to insure that any action authorized, funded, or carried out by the Federal government is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species. This biological opinion covers the actions of two federal agencies as related to this project: 1) FHWA, as this agency will fund, in part, the road construction associated with this project; and 2) the Service, as the agency which will issue the incidental take permit.

Road construction that will occur as part of the proposed project will require a permit from the U.S. Army Corps of Engineers (COE). However, the COE permit will not result in any impacts to Indiana bats beyond those addressed in this consultation with the FHWA. The Service will provide a copy of this biological opinion to the COE to demonstrate that the FHWA has fulfilled obligations to consult with the Service.

The HCP applicants chose to address the impacts of the road construction, as well as commercial development and airport improvements that will occur in the area following the road construction. However, even though the HCP participants chose to address the road construction impacts, the FHWA is required to fulfill section 7 consultation requirements for this project. Therefore, this biological opinion will address the adequacy of the HCP in fulfilling the section 7 consultation requirements of the FHWA. In addition, this biological opinion evaluates the Service's issuance of an incidental take permit pursuant to section 10 of the Act, as the issuance of this permit is also a federal action requiring consultation under section 7 of the Act.

This biological opinion is based on information from the following sources:
1) the applicants' HCP (American Consulting, Inc. 2001, 2002) (draft dated September 19, 2001 and received by the Service on September 28, 2001 and final dated March 18, 2002, respectively);

2) the Draft Environmental Assessment for Issuance of an Endangered Species Act Section 10(a)(1)(B) Incidental Take Permit for the Indiana Bat (*Myotis sodalis*) to the Interagency Task Force Proposing the Six Points Road Interchange and Related Development (USFWS 2001a);
3) reports on Indiana bat research conducted in the action area (3D Environmental Services Inc. 1994; 3D Environmental Services Inc. 1995; 3D Environmental Services Inc. 1996; American Consulting Engineers, Inc. 1998; American Consulting Engineers, Inc. 1999; American Consulting, Inc. 2000); and
4) meetings, phone calls, and written correspondence with the applicants and their consultants. Field investigations were also conducted by personnel from the Service's Bloomington, Indiana Field Office (BFO). A complete administrative record of this consultation is on file at BFO.

CONSULTATION HISTORY

Consultation with the Service on Indiana bats in the vicinity of the IIA began on April 24, 1991 when the Service attended an Environmental Scoping Meeting and advised the Federal Aviation Administration (FAA) that planned construction of new runways, terminals, roads, and buildings associated with the expansion of the IIA would potentially adversely affect the Indiana bat. The Service requested that a biological assessment for the Indiana bat be prepared as part of the Draft Environmental Impact Statement for the Master Plan Development Actions at the IIA. As a result of this process, it was determined that formal consultation for the project would be required. On February 27, 1992, the U.S. Army Corps of Engineers issued COE Public Notice 199200165. That notice announced application for a Clean Water Act Section 404 Permit for IIA for the purpose of a wetland fill to facilitate the construction of new runways, terminals, roads and buildings associated with the expansion of the IIA. On March 3, 1992, the Service issued the Biological Opinion on Master Plan Development Actions at the Indianapolis International Airport and accompanying incidental take statement for the anticipated take of Indiana bats as the result of the loss of foraging and roosting habitat associated with IIA expansion activities.

Under the terms of the incidental take statement, the FAA was required to implement measures to avoid and minimize impacts to Indiana bats to the extent possible. They also implemented an Indiana bat monitoring program in and adjacent to the project area. As a result of these efforts, extensive research was conducted on Indiana bats in the action area during the summers of 1994 through 1999.

In October 1995 the U.S. Department of Transportation, Federal Highway Administration, Indiana Department of Transportation, and Indianapolis Department of Capital Asset Management issued the Environmental Assessment Six Points Road Interchange, Hendricks and Marion Counties, Indiana, Project No. DEM-070-3(196)68, DES. NO. 9500900 (American Consulting Engineers, Inc. 1995). This document detailed plans for two new interchanges on Interstate-70 as well as additional highway construction. The purpose of the proposed highway improvements was to improve access and facilitate development in the vicinity of the IIA. The Environmental Assessment acknowledged that the proposed project would have adverse impacts on Indiana bats, and that consultation with the Service

under section 7 of the Act would be conducted.

As discussions on the consultation proceeded, it became apparent that indirect effects to be addressed within the consultation extended well beyond the footprint of the highway construction. A stated objective of the proposed highway improvements is to facilitate commercial development and to allow for expansion and improvements at the IIA. Much of this development is to occur in habitat known to be occupied by the Indiana bat. Therefore, the indirect effects of this associated development, in addition to the direct effects of highway construction, must be addressed within the project's section 7 formal consultation. The Interagency Task Force that is proposing the project began a series of meetings with the Service in 1995 to discuss options for addressing impacts of the project on Indiana bats. After evaluating their options, the task force chose to develop an HCP for the project area which addresses both the impacts caused by road construction, as well as the impacts associated with the commercial development and airport expansion/improvements that will be facilitated by the highway improvements.

On March 9, 2000, a meeting was held at BFO to initiate the HCP. At that meeting, consultants from American Consulting Engineers, Inc. (ACE) submitted a Summary of the Preliminary Habitat Conservation Plan for the Six Points Road Interchange on behalf of the task force. The Service provided input at the meeting, and detailed comments on the document in a letter on April 3, 2000. On April 7, 2000, the Service received a Preliminary Draft Habitat Conservation Plan: Six Points Road Interchange from ACE. (Note that ACE prepared and sent this document prior to receiving the Service's letter dated April 3. Therefore, ACE did not have the benefit of the comments in the letter in preparing their preliminary draft HCP). The Service provided summary comments on the preliminary draft HCP in an e-mail on April 25 followed by a letter with detailed comments on May 1. On May 8, 2000, a meeting was held at BFO to discuss the preliminary draft HCP. Questions related to the draft were discussed and ACE indicated that they would provide a revised draft. Information that ACE needed from the Service in order to proceed with the draft was identified at the meeting; this information was provided by e-mail the following day. A field inspection of the site was completed by three BFO biologists on June 21 and comments provided to ACE on June 28. The revised draft was received on November 3. Comments on three major issues were provided by the Service in a letter dated November 16, and comprehensive comments were provided in a second later dated December 7, 2000. In January and February 2001 there was extensive coordination (which included phone calls, meetings, correspondence, and a field inspection) between ACE and the Service to evaluate specific mitigation options to be incorporated into the HCP. On February 1, 2001, the Service received the Draft Habitat Conservation Plan for the Six Points Road Interchange and Associated Development. Service comments on this draft were provided on February 26, 2001, and a revised draft was received by the Service on April 30, 2001. Comments and coordination on this draft were through a series of e-mails and phone calls between May 5 and May 18, 2001.

The final draft HCP (dated September 19, 2001) and application for an incidental take permit was submitted to BFO on September 28, 2001. The Service completed the Draft Environmental

Assessment for Issuance of an Endangered Species Act Section 10(a)(1)(B) Incidental Take Permit for the Indiana Bat (*Myotis sodalis*) to the Interagency Task Force Proposing the Six Points Road Interchange and Related Development (USFWS 2001a) in November 2001; this document is hereafter referred to as the EA. A Federal Register notice titled Notice of Availability of a Draft Environmental Assessment and Habitat Conservation Plan and Receipt of an Application for an Incidental Take Permit From the Interagency Task Force Proposing the Six Points road Interchange and Related Development in Marion and Hendricks Counties, IN (USFWS 2001b) was published on November 20, 2001 with a 60-day comment period. A notice of comment period extension (USFWS 2002) was published in the Federal Register on February 6, 2002 and extended the comment period until March 8, 2002. The comment period was extended to be certain that the public had ample opportunity to provide comments in light of the department-wide prohibition on the use of electronic mail and the Internet. The notices solicited public comments on the EA, HCP and permit application. One comment letter was received and the comments are addressed in the final Environmental Assessment.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

There are two Federal actions being evaluated in this biological opinion. First, is the preferred alternative in the Service's EA (USFWS 2001a), which is to issue a section 10(a)(1)(B) Incidental Take Permit for the incidental take of Indiana bats. Second, is the FHWA's proposal to construct a new highway interchange and associated highway improvements in the vicinity of the IIA; these actions will facilitate additional development in the area. The proposed project is described in detail in the applicants' HCP (American Consulting, Inc. 2001). A summary of the action as described in the HCP follows.

An Interagency Task Force composed of the Federal Highway Administration, the Indiana Department of Transportation, the Indianapolis Airport Authority, the Indianapolis Department of Public Works, the Indianapolis Department of Metropolitan Development, and the Hendricks County Board of County Commissioners proposes to construct a new interchange on Interstate 70 (I-70) and associated highway improvements in the vicinity of Six Points Road in Hendricks and Marion Counties, Indiana. Additional development will occur in the area in association with the road construction. Associated development includes: 1) expansion and improvements at the Indianapolis International Airport; and 2) commercial and industrial development within the privately owned AmeriPlex area south of I-70. It has been determined through surveys that a colony of federally endangered Indiana bats summers in the project area. (The Indiana bat is a migratory species which hibernates in caves during winter and then migrates to summer range). The Biological Assessment conducted by the applicants (American Consulting Engineers, Inc. 1996) concluded that the proposed actions will result in incidental take of the Indiana bat; the U.S. Fish and Wildlife Service concurred with this finding. Therefore, the Task Force has voluntarily submitted an application for a permit for incidental take as a means of complying with the

Endangered Species Act (ESA) of 1973, as amended. The submission of the ESA Section 10(a)(1)(B) Incidental Take Permit application requires the development of a Habitat Conservation Plan (HCP) by the applicants which details the measures which will be taken to avoid, minimize, and mitigate impacts to Indiana bats.

The total area included in the HCP boundary is approximately 1,448 hectares (ha) in the general area bordered by Stafford Road on the north, Bridgeport Road and Flynn Road on the east, the Section Line west of Six Points Road on the west, and the County Road 650 South/Flynn Road extension on the south. In addition, a northeastern arm of the HCP boundary extends parallel to I-70; this area is required for the new IIA Mid-Field Terminal Interchange and associated development. Within the HCP boundary, 247 ha (17%) are classified as bat habitat; these are primarily forested areas, wooded pasture, or open areas with scattered trees. As a result of the proposed project, it is anticipated that 139 ha of this habitat will be destroyed. Detailed mapping of the HCP boundary and bat habitat within the boundary are included in Figure 12.2 of the HCP.

Conservation Measures

The following Conservation Measures have been incorporated into the HCP; these measures are designed specifically to avoid and minimize impacts of the proposed action on Indiana bats. The Service has analyzed the effects of the proposed action based on the assumption that all Conservation Measures will be implemented. More detailed descriptions of conservation measures are provided in the HCP.

1. Seasonal Tree Cutting Restrictions
No trees will be cleared between April 15 and September 15, the dates during which concentrations of Indiana bats occupy maternity roosts in the project area.

2. Mitigation Plantings
Measures to provide permanent replacement of Indiana bat habitat will include planting 140 ha of hardwood seedlings within the known roosting and foraging range of the Indiana bat colony. All plantings will be monitored for five years and corrective measures will be taken if the plantings do not meet survival and species composition goals. There will be no manipulation of vegetation in these areas without consultation with the Service's BFO. Planting areas will have a deed restriction attached to the land title to preserve the planted habitat in perpetuity. Proposed planting areas are mapped in Figure 12.1 of the HCP.

3. Permanent Protection of Existing Indiana Bat Habitat within the HCP Boundary
Approximately 71.2 ha of existing bat habitat and 8.8 ha which buffer existing habitat that is owned by the IAA will be protected in perpetuity within the HCP boundary. There will be no manipulation of vegetation in these areas without consultation with the Service's BFO. Areas to be permanently protected are mapped in Figure 12.2 of the HCP.

4. Permanent Protection of Existing Indiana Bat Habitat Outside the HCP Boundary.
Approximately 80 ha of existing bat habitat that is owned by the IAA will be protected in perpetuity outside the HCP boundary. All parcels to be permanently protected are within the range of the Indiana bat maternity colony that will be affected by the proposed project. Emphasis will be on protecting parcels along the East Fork of White Lick and corridors which will improve the connectivity of existing habitat patches to the creek corridor. There will be no manipulation of vegetation in these areas without consultation with the Service's BFO. Areas to be permanently protected are mapped in Figure12.1 of the HCP.

5. Purchase Additional Existing Indiana Bat Habitat
The applicants agree to purchase and permanently protect additional Indiana bat habitat within the range of the colony; expenditures for these lands will range from $475,000 to $500,000. Location and suitability of this additional acreage as Indiana bat habitat will be approved by the Service. There will be no manipulation of vegetation in these areas without consultation with the Service's BFO.

6. Establish Buffers Around Protected Areas
Where possible and appropriate, buffers approximately 50 feet wide will be established around any existing woodlot or mitigation planting areas, which will be maintained in perpetuity. Buffers will be established around lands protected as Indiana bat habitat when those buffer areas are on land owned by the IAA.

7. Training of Project Personnel
Project personnel, including engineering supervisors and equipment operators, will be instructed about the terms of the HCP and the restrictions imposed by it before construction begins.

8. Public Outreach on Indiana Bats
The applicants have agreed to work with the Service's BFO to develop and implement an outreach program to educate the public regarding the Indiana bat.

9. Monitoring and Research Program.
The purpose of the monitoring plan proposed in the HCP is: 1) to assess the effectiveness of mitigation efforts over time; 2) to provide for adaptive management (i.e., determine the need for adjustments to management of the Indiana bat habitat); and 3) to collect valuable scientific data that will contribute to the recovery of the Indiana bat. The proposed Indiana bat monitoring plan includes an extensive mist netting survey. Mist net surveys to determine the presence of Indiana bats will be conducted annually for the duration of the HCP, beginning with the first summer following the start of construction. It is assumed construction will begin in 2002 under the current project time line. Therefore, mist netting is anticipated to occur annually from 2002 through 2016 (or for a total period of 15 years). Some of the Indiana bats captured during the mist netting surveys will be fitted with radio transmitters. Telemetry data will be used to document the location of roost trees and the foraging range of the colony. Emergence (dusk) counts will be conducted at each known primary maternity roost tree during the

period when bats are present during the summer maternity roosting season.

STATUS OF THE SPECIES

This section is a discussion of the Indiana bat. It includes information on the species' life history, its habitat and distribution, and past human and natural factors that have led to the current status of the species.

The Indiana bat was officially listed as an endangered species on March 11, 1967 (Federal Register 32[48]:4001) under the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U.S.C. 668aa[c]). The Endangered Species Act of 1973 extended full protection to the species. The Service has published a recovery plan (USFWS 1983) which outlines recovery actions. Briefly, the objectives of the plan are to: (1) protect hibernacula; (2) maintain, protect, and restore summer maternity habitat; and (3) monitor population trends through winter censuses.

Thirteen winter hibernacula (11 caves and two mines) in six states were designated as Critical Habitat for the Indiana bat in 1976 (Federal Register, Volume 41, No. 187). In Indiana, two winter hibernacula were Designated Critical Habitat, including Big Wyandotte Cave in Crawford County and Ray's Cave in Greene County. Neither of these caves are in the vicinity of the current proposed project; the closest, Ray's Cave, is more than 100 kilometers (km) from the project area.

Based on censuses taken at hibernacula, the total known Indiana bat population is estimated to number about 353,000 bats (based on 1997 survey). The most severe declines in wintering populations have occurred in two states: Kentucky, where 180,000 bats were lost between 1960 and 1997, and Missouri, where 276,000 Indiana bats were lost between 1980 and 1997. In Indiana populations dropped by 50,000 between the earliest censuses and 1980, but have rebounded to former levels in recent years. Currently, over half of all the hibernating Indiana bats in existence (approximately 182,500) winter in Indiana.

A variety of factors have contributed to Indiana bat population declines (USFWS 1983). Sometimes their winter hibernacula are flooded, ceilings of the hibernacula collapse, or cold temperatures kill the bats through hypothermia. Exclusion of bats from hibernacula through blocking of entrances, installation of gates that do not allow for bat ingress and egress, disruption of cave air flow, and human disturbance during hibernation have been documented causes of Indiana bat declines. Because many known threats are associated with hibernation, protection of hibernacula has been a management priority.

Despite the protection of most major hibernacula, population declines have continued. Continued population declines of Indiana bats, in spite of efforts to protect hibernacula, have led scientists to the conclusion that additional information on summer habitat is needed (Romme et al. 1995). In addition to increased focus on summer habitat, attention is also being directed to pesticide contamination. Insecticides have been known or suspected as the cause of a number of bat die-offs in North America,

including endangered gray bats in Missouri (Clark et al. 1978). The insect diet and longevity of bats also exposes them to persistent organochlorine chemicals which may bioaccumulate in bat tissue and cause sub-lethal effects such as impaired reproduction.

Description and Distribution

The Indiana bat is a medium-sized bat with a head and body length that ranges from 41 to 49 mm. There are no recognized subspecies. The species range includes much of the eastern half of the United States, from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida. The Indiana bat is migratory, and the above described range includes both winter and summer habitat. The winter range is associated with regions of well-developed limestone caverns. Major populations of this species hibernate in Indiana, Kentucky, and Missouri. Smaller winter populations have been reported from Alabama, Arkansas, Georgia, Illinois, Maryland, Mississippi, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Virginia, and West Virginia. More than 85% of the entire known population of Indiana bats hibernates in only nine caves.

Life History

Generally, Indiana bats hibernate from October through April (Hall 1962; LaVal and LaVal 1980), depending upon local weather conditions. Bats cluster on cave ceilings in densities ranging from 300-484 bats per square foot. Hibernation facilitates survival during winter when prey are unavailable. However, the bat must store sufficient fat to support metabolic processes until spring. Substantial risks are posed by events during the winter that interrupt hibernation and increase metabolic rates.

After hibernation ends in late March or early April, most Indiana bats migrate to summer roosts. Female Indiana bats emerge from hibernation in late March or early April, followed by the males. The period after hibernation but prior to migration is typically referred to as staging. Most populations leave their hibernacula by late April. Migration is stressful for the Indiana bat, particularly in the spring when their fat reserves and food supplies are low. As a result, adult mortality may be the highest in late March and April.

Summering Indiana bats roost in trees in riparian, bottomland, and upland forests. Roost trees generally have exfoliating bark which allows the bat to roost between the bark and bole of the tree. Cavities and crevices in trees also may be used for roosting. A variety of tree species are known to be used for roosts including (but not limited to) silver maple (*Acer saccharinum*), shagbark hickory (*Carya ovata*), shellbark hickory (*Carya laciniosa*), bitternut hickory (*Carya cordiformis*), green ash (*Fraxinus pennsylvanica*), white ash (*Fraxinus americana*), Eastern cottonwood (*Populus deltoides*), northern red oak (*Quercus rubra*), post oak (*Quercus stallata*) , white oak (*Quercus alba*), shingle oak (*Quercus imbricaria*), slippery elm (*Ulmus rubra*), American elm (*Ulmus americana*), sassafras (*Sassafras albidum*), and sugar maple (*Acer saccharum*) (Romme et al. 1995). At one site in southern Indiana, black locust (*Robinia psuedoacacia*) was used extensively by

roosting bats (Pruitt 1995). Structure is probably more important than the species in determining if a tree is a suitable roost site; tree species which develop loose, exfoliating bark as they age and die are likely to provide roost sites. Male bats disperse throughout the range and roost individually or in small groups. In contrast, reproductive females form larger groups, referred to as maternity colonies.

Maternity colonies, which may be occupied from mid-April to mid-September, usually contain 100 or fewer adult female bats. Females each give birth to a single young between mid June and early July. Young Indiana bats are capable of flight within a month of birth. They spend the latter part of the summer foraging to accumulate fat reserves for the fall migration and hibernation. Maternity colonies occupy roost sites in trees in forested riparian, floodplain, or upland habitats (Romme et al. 1995).

Female Indiana bats exhibit strong site fidelity to summer roosting and foraging areas, that is, they return to the same summer range annually to bear their young. Traditional summer sites are essential to the reproductive success of local populations. It is not known how long or how far female Indiana bats will search to find new roosting habitat if their traditional roost habitat is lost or degraded. If they are required to search for new roosting habitat, it is assumed that this effort places additional stress on pregnant females at a time when fat reserves are low or depleted and they are already stressed from the energy demands of migration and pregnancy.

Indiana bat roosts are ephemeral and frequently associated with dead or dying trees. Most roost trees may be habitable for only 2-8 years (depending on the species and condition of the roost tree) under natural conditions. Gardner et al. (1991a) evaluated 39 roost trees and found that 31% were no longer suitable the following summer, and 33% of those remaining were unavailable by the second summer. A variety of suitable roosts are needed within a colony's traditional summer range for the colony to continue to exist. Indiana bat maternity sites generally consist of one or more primary maternity roost trees which are used repeatedly by large numbers of bats, and varying numbers of alternate roosts, which may be used less frequently and by smaller numbers of bats. Bats move among roosts within a season and when a particular roost becomes unavailable from one year to the next. It is not known how many alternate roosts must be available to assure retention of a colony within a particular area, but large, nearby forest tracts would improve the potential for an area to provide adequate roosting habitat (Callahan 1993). In addition to having exfoliating bark, roost trees must be of sufficient diameter. Trees in excess of 40 cm diameter at breast height (dbh) are considered optimal for maternity colony roost sites, but trees in excess of 22 cm dbh are often used as alternate maternity roosts. Male Indiana bats have been observed roosting in trees as small as 8 cm dbh.

In Illinois, Gardner et al. (1991b) found that forested stream corridors, and impounded bodies of water, were preferred foraging habitats for pregnant and lactating Indiana bats, which flew up to 2.4 km from upland roosts to forage. Females typically utilize larger foraging ranges than males (Garner and Gardner 1992). Bats forage at a height of approximately 2-30 meters under riparian and floodplain trees (Humphrey et al. 1977). They forage between dusk and dawn and feed exclusively on flying insects, primarily moths, beetles, and aquatic insects. Romme et al. (1995) cited several studies which

document that Indiana bats also forage in upland forests, as well as along the edges of agricultural field adjacent to forests.

After the summer maternity period, Indiana bats migrate back to traditional winter hibernacula. Some male bats may begin to arrive at hibernacula as early as July. Females typically arrive later and by September numbers of males and females are almost equal. Autumn "swarming" occurs prior to hibernation. During swarming, bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in the caves during the day. By late September many females have entered hibernation, but males may continue swarming well into October in what is believed to be an attempt to breed with late arriving females. Swarming is important to the life history of the bat as most copulation occurs during this time. Females store sperm through the winter and fertilization occurs in the spring. Females are pregnant when they arrive at the maternity roost. Fecundity is low; female Indiana bats produce only one young per year.

ENVIRONMENTAL BASELINE

This section is an analysis of the past effects of State, tribal, local and private actions already affecting the species within the action area and the present effects within the action area that will occur contemporaneously with the consultation in progress. It includes a description of the status of the species and its critical habitat within the action area.

The natural environment of the action area is summarized below. Additional information is available in the Environmental Assessment for the Six Points Road Interchange (American Consulting Engineers, Inc. 1995).

The action area is within the Tipton Till Plain Section of the Central Till Plain Natural Region of Indiana (Homoya et al. 1985). This section is characterized by a mostly undissected plain which was formerly covered by an extensive beech-maple-oak forest. The soils are typically poorly drained silt and silty clay loams. Tree species typical of this section include red maple (*Acer rubrum*), pin oak (*Quercus palustris*), bur oak (*Q. macrocarpa*), swamp white oak (*Q. bicolor*), Shumard's oak (*Q. shumardii*), American elm, and green ash. On better drained sites beech (*Fagus grandifolia*), sugar maple, black maple (*A. nigrum*), white oak, northern red oak, shagbark hickory, tulip poplar (*Lireodendron tulipifera*), slippery elm, basswood (*Tilia americana*) and white ash are also considered characteristic (Homoya et al. 1985).

The native flatwoods community in this section is now largely confined to scattered woodlots; the majority of the area has been converted to agricultural land uses. In the project area, agriculture, expansion of the IIA, and residential and commercial development in the vicinity of the IIA have resulted in extensive clearing and construction. Current land uses in the project area, based on the Environmental Assessment for the Six Points Road Interchange (American Consulting Engineers, Inc. 1995), include: agricultural crop production 37.7%; highway right-of-way (dominated by fescue)

26.6%; forest (9.0%); residential (7.9%); commercial (7.4%); pasture (3.7%); and industrial (3.5%).

Land use patterns are similar in areas surrounding the project area. Agriculture is the dominant land use. In addition, conversion of land to commercial and residential development is widespread. Forest cover is limited. According to forest inventory data, Marion County is less than 1% forested and Hendricks County is approximately 7% forested (Smith and Golitz 1986).

The East Fork of White Lick Creek and its tributaries provide drainage for the western two-thirds of the project area. The eastern portion of the project area is drained by tributaries of the West Fork of the White River, which does not cross the project area. Vegetation adjacent to these streams and tributaries includes row crops, pasture, old fields, and patches of riparian forest. Within the project area, the highest quality wildlife habitat is associated with stream corridors and associated strips and small blocks of riparian forests. In addition to riparian forest vegetation, isolated woodlots also occur within the project area. In addition, some grassy and brushy areas with widely scattered mature trees provide limited wildlife habitat.

A biological community assessment of the East Fork of White Lick Creek was conducted by the Indiana Department of Environmental Management (IDEM) in July of 1997. This study established baseline conditions for the EFWLC within the limits of the proposed construction; results are detailed in IDEM's report (IDEM 1997). The Index of Biotic Integrity class for the sites in the project area was "good." This class indicated that species richness is somewhat below expectation, especially due to the loss of the most intolerant forms; some species are present with less than optimal abundance or size distributions; and trophic structures show some signs of stress. Water quality parameters for the sample sites were within the expected range. Vegetation adjacent to the stream within the project area includes pasture, old field with scattered large trees, and patches of floodplain forest.

Tributaries to the East Fork of White Lick Creek in the project area include Center Creek, Middle Creek, North Creek, South Branch, Luck Creek, Guilford Branch, and Flynn Creek. All of these are classified as intermittent streams. Biotic community and water quality assessment of some of these streams is ongoing.

The Indiana Bat in the Action Area

As noted within in the **CONSULTATION HISTORY** section of this document, previous construction in the project area that was associated with expansion and improvements at the IIA was subject to consultation under section 7 of the Act. Under the terms of the biological opinion and incidental take statement issued in December of 1992 (and subsequent amendments), the FAA was required to implement measures to avoid and minimize take of Indiana bats, including: 1) the development of a Sustained Mitigation Area where hardwood seedlings were planted and permanently protected to improve Indiana bat habitat adjacent to the project area in the long-term; and 2) parcels of existing Indiana bat habitat both within and adjacent to the project area, were set aside for protection in

perpetuity or for interim protection through 2010. Both the planting areas and the protected parcels of existing bat habitat will be considered part of baseline conditions for the current project. In addition to habitat protection, the FAA also implemented extensive Indiana bat monitoring in the action area. Detailed information is available in annual reports submitted to the Service. These reports form the basis for this discussion on the current status of Indiana bats in the area.

Indiana bat habitat requirements are described in the **Life History** section of the biological opinion. Indiana bats are dependent on forested habitat during summer; the species roosts in trees and forages primarily in forests or open areas adjacent to forests. Within the HCP boundary, 247 ha (17%) are classified as bat habitat; these are primarily forested areas, wooded pasture, or open areas with scattered trees (American Consulting, Inc. 2001). Much of the remaining forested habitat within the project area occurs in linear strips or small blocks along stream corridors. However, small patches of forest occur throughout the project area.

Habitat quality for Indiana bats in a portion of the project area was assessed in the **Biological Assessment: Effects of the Six Points Road Interchange and Related Roadway Improvements in Hendricks and Marion Counties, Indiana on the Indiana Bat, *Myotis sodalis*** (American Consulting Engineers, Inc. 1996). The analysis area in this assessment was limited to the right-of-way required for road improvements. Approximately 33 ha of bat habitat were assessed; 20 ha, 3 ha, and 10 ha were categorized as high, moderate, and low quality habitat, respectively. While a detailed assessment of habitat quality was not done for the remainder of the project area, based on observations in the project area we expect that the results would be similar. There are scattered patches of high quality Indiana bat habitat remaining in the project area.

In addition to the quality of habitat, quantity of Indiana bat habitat is also a concern in the project area. Approximately 17% of the habitat within the HCP boundary is classified as bat habitat, but as previously noted this includes areas with only sparse tree cover. Only approximately 9% of the project area is forested (i.e., predominant vegetation is trees) (American Consulting Engineers, Inc. 1995). Based on a thorough review of literature on Indiana bat summer habitat, Romme et al. (1995) concluded that areas with less than 5% cover by deciduous forest will not support summering Indiana bats. Areas considered optimal are generally at least 30% forested. Forest cover within the project area is low compared to most areas that support maternity colonies. Of currently known Indiana bat maternity colonies in Indiana, none occur in an area with more fragmented forests than the project area.

Extensive research was conducted on Indiana bats in the action area during the summers of 1994 through 1999. Mist netting in August 1994 resulted in the capture of two Indiana bats along the East Fork of White Lick Creek, immediately south of the project area (3D Environmental Services Inc. 1994). One of the Indiana bats captured was a post-lactating female and the other a juvenile male; the capture of a post-reproductive adult female and a juvenile Indiana bat provided evidence that a maternity colony was located in the immediate vicinity of the project area. Mist netting (conducted along the East Fork of White Lick Creek and near an Indiana bat maternity roost tree) during the next

five summers (1995-1999) resulted in the capture of 34 Indiana bats: 6 in 1995 (3D Environmental Services Inc. 1995); 7 in 1996 (3D Environmental Services Inc. 1996); 3 in 1997 (American Consulting Engineers, Inc. 1998); 8 in 1998 (American Consulting Engineers, Inc. 1999); and 10 in 1999 (American Consulting, Inc. 2000). The 34 Indiana bats captured included 15 reproductively active adult females, three nonreproductive (or reproductive status unknown) adult females, one adult male, and 15 juveniles. Two additional adult male Indiana bats were captured in artificial roosting structures erected in the area; one was captured in 1995 and one in 1996.

During the period 1995-1999, radio transmitters were attached to 30 of the bats captured in the action area. The bats movements were monitored, allowing researchers to assess the roosting and foraging habits of the Indiana bats in the area. Based on data gathered from radio-tagged Indiana bats, it is known that at least one maternity colony of Indiana bats utilizes the proposed project area. The possibility that more than one maternity colony is using the project area cannot be eliminated. The majority of the radio-tagged bats were captured near a known maternity roost. When mist netting bats near a known roost, the likelihood of capturing a bat from a colony other than the one using that roost is minimal.

Telemetry enabled researchers to collect information on the roosting habits of bats in the action area. Trees used by roosting bats were categorized as "primary" or "alternate" roost trees. The definition of a primary roost is a tree used by more than 30 bats and used on more than one occasion (Callahan et al. 1997); all other trees used by roosting bats are called alternate roost trees. Two primary roost trees used by the maternity colony of bats in the area have been located using telemetry. One of these trees (a dead cottonwood) was used in 1997 and 1998. The maximum number of bats counted exiting this tree was 64 during a dusk count in 1998. This tree lost a major portion of its bark during a storm in 1998, and was not used subsequently. The other primary roost tree was first located in 1996, and was used again in 1997, 1998, and 1999. This tree is a large (59.3 cm dbh) dead shagbark hickory tree. In excess of 100 dusk counts have been conducted at this roost trees since its discovery. The maximum number of bats counted during any given dusk count was 146 on July 15, 1999. Large fluctuations in the number of bats utilizing this tree suggest that there are other primary roost trees being used by this colony, but no others have been identified since the loss of the cottonwood roost in 1998 (American Consulting Engineers, Inc. 1999).

Large numbers of alternate roost trees were also located by tracking radio-tagged bats to their roosts. Detailed information on alternate roosts was provided in the annual reports referenced above. A variety of trees were used as alternate roosts, but the majority were shagbark hickories. In 1999, 10 of 12 alternate roost trees were shagbark hickories. Both living and dead hickories were used as alternate roosts.

The primary roost tree and most of the alternate roost trees that have been identified are located outside the HCP boundary, but within the action area of the project, in a privately owned woodlot. This woodlot is approximately 36 ha in size and represents one of the largest blocks of mature forest

remaining within the range of this maternity colony of bats. The woodlot is dominated by mature mixed hardwood trees, including many large shagbark hickories which appear to be preferred by roosting bats. The data collected to date suggest that this woodlot is a key element of the habitat used by this maternity colony.

Data collected on radio-tagged bats in the action area have also allowed researchers to assess bat movements and foraging habits. Bats in the area routinely fly at least 2 km from their roosts to forage (American Consulting Engineers, Inc. 1999). Some radio-tagged bats were found up to 5 km from the roost site. Generally, the distance traveled to foraging sites by bats in the area have been similar to distances reported for bats in Illinois (Gardner et al. 1991b) and southern Indiana (Pruitt 1995, Montgomery Watson 1999). The data collected in the vicinity of the IIA show that individual Indiana bats typically fly to the same foraging areas nightly. However, not all bats from the colony use the same foraging areas. The majority of Indiana bats concentrated their movements south of I-70. However, most of the radio-tagged bats were located north of I-70 on at least a few occasions. A few bats appeared to concentrate their movements in wooded areas north of I-70. Telemetry locations for most bats were concentrated south and east of the HCP boundary. Areas where locations were concentrated included the riparian corridor of the EFWLC. As previously noted, use of the EFWLC riparian corridor included a primary maternity roost in a large cottonwood located adjacent to the creek. Patches of forested habitat not associated with the creek, as well as adjoining agricultural areas, were also used by foraging bats. Collectively, use of almost all suitable Indiana bat habitat within the project area by radio-tagged bats has been documented.

The previous efforts to minimize impacts to Indiana bats in the action area involved both the preservation of existing bat habitat, and an attempt to create additional habitat. Indiana bats return to the same location each year in the spring to raise young. To minimize impacts to Indiana bats that summered in the project area, it was necessary to ensure that alternative existing habitat was available as close as possible to the project area. As a condition of the FAA's 1992 incidental take statement (and subsequent amendments), existing bat habitat was set aside for permanent protection. Interim Mitigation Areas were also protected. The purpose of setting aside these interim areas was to provide habitat capable of supporting Indiana bats that would be available until 2010 while the Indiana bats in the area adjusted to changing habitat conditions (i.e. loss of habitat associated with the airport expansion). The Sustained Mitigation Area to the south of the project area (3D Environmental Services Inc. 1992) was also established at this time. Approximately 160 ha of (formerly agricultural) land was planted with hardwood seedlings within the Sustained Mitigation Area. These plantings will be preserved as forested bat habitat in perpetuity. To the extent possible, the plantings were linked to riparian corridors and existing forested parcels. The immediate value of the mitigation plantings to bats was: 1) to provide areas that will not be cleared for development that link existing habitat patches; and 2) to protect water quality by protecting riparian areas from development. Over time, we anticipate that the mitigation plantings will develop into quality roosting and foraging habitat for Indiana bats.

In addition to efforts to protect existing habitat and to create additional habitat for the future, the FAA

also attempted to enhance the value of existing roosting habitat through: 1) the installation of artificial roost structures such as bat boxes and artificial bark; 2) mechanical exfoliation of bark on existing trees; and 3) relocation of entire dead trees deemed suitable for roosting. Enhancing bat habitat with artificial roosting structures had not been attempted before, and this was recognized as an experimental technique. In order to take full advantage of the research value of the work, the FAA conducted an extensive monitoring program to determine the level of use of artificial structures (3D Environmental 1995, 1996; American Consulting Engineers, Inc. 1998, 1999, 2000). Two male Indiana bats were located in these structures; this was the first documented use of artificial roost structures by Indiana bats. The FAA has concluded their obligations to maintain and monitor these artificial roost structures. However, many of these structures remain in the action area.

In 1995 and 1996, research was conducted to characterize potential sound exposures to Indiana bats foraging and roosting in the vicinity of the IIA. Only one primary maternity roost (the one which was used annually through 1999) had been documented at the time. That roost is located just .6 km south of I-70, and is also near the flight path for two of the IIA's runways. Highway noise above background levels was detected almost continuously at the maternity roost. In addition, bats were exposed to high noise levels associated with aircraft overflights. It is apparent from these studies that these noise levels were tolerable to this colony of Indiana bats, at least to the extent that the habitat was not abandoned. More detailed results are provided in the 1996 annual report (3D Environmental 1996).

Given the nature of the landscape surrounding the action area, there is little potential for this colony to relocate if the quality or quantity of habitat in the area could no longer support the colony. The continued survival of this colony is likely dependent on maintaining suitable habitat within the action area of the project.

EFFECTS OF THE ACTION

Evidence that a maternity colony existed in the action area was first collected during bat surveys in 1994, and continued existence of the maternity colony has been documented every summer since that time. Based on counts conducted in 1999, a maternity colony consisting of at least 146 bats (adult reproductive females and their young-of-the-year) uses the project area. In addition, an unknown number of males and non-reproductive females also use the area. Construction of the proposed road improvements and associated development is expected to result in the permanent loss of approximately 139 ha of suitable summer foraging and roosting habitat for these Indiana bats. Degradation of remaining habitat may also occur as the result of increased fragmentation and increased disturbance. These effects are discussed in more detail below.

A feature of Indiana bat biology that is integral to the discussion of effects of the proposed project is the fact that female Indiana bats exhibit strong site fidelity to summer roosting and foraging areas. That is, they return to the same summer range annually to bear their young. If the summer range is modified such that females are required to search for new roosting habitat or foraging areas, it is assumed that

this effort places additional stress on pregnant females at a time when fat reserves are low or depleted and they are already stressed from the energy demands of migration. This in turn could affect the reproductive fitness and productivity of the bats.

Based on our knowledge of Indiana bat summer habitat use, and the specific information that has been collected on this colony, we assessed the impact of the loss and degradation of habitat in the project area on the Indiana bat colony. We should note that there are many aspects of Indiana bat summer habitat that are not fully understood. The first maternity colony of Indiana bats was not discovered until 1971. The colony was discovered when a dead elm tree was bulldozed, and a colony of bats emerged from under the loose bark of the tree as it was pushed over. Several of the bats were captured, and subsequently identified as Indiana bats. Prior to this time, it was not known where female Indiana bats roosted and raised young. Since that time, considerable research has been done on Indiana bats during the summer, but many questions remain unanswered. Therefore, we cannot precisely predict how Indiana bats will be impacted by the proposed project. Our assessment is based on the best data that are available.

Effects on Foraging Habitat

The primary effect of the proposed activities on the colony of Indiana bats in the action area will be the loss of foraging habitat. All 139 ha of habitat that will be cleared is suitable Indiana bat foraging habitat. Telemetry data demonstrate that most of the maternity colony forages within the HCP boundary at least occasionally, although no radio-tagged bat foraged exclusively in this area. In 1999 (the last year for which extensive telemetry data are available), nine Indiana bats (adult females or juveniles) were radio tracked. Each bat was tracked for approximately six days. Seven of the nine bats (78%) were located within the HCP boundary (presumably foraging) at some time. Of those, two bats foraged extensively within the HCP boundary. Assuming these bats are representative of the colony, approximately 32% of the colony forages extensively within the HCP boundary and an additional 56% forages in this area occasionally. When these bats return to the summer range, we expect that they will attempt to use the same foraging areas that were used in previous years. Within the HCP boundary, 139 of the 247 ha of habitat previously available will be gone after the clearing occurs for the proposed project. Bats that only foraged in the area occasionally obviously are familiar with other foraging areas in addition to those within the HCP boundary; these bats may be able to adjust for lost habitat by spending more time foraging in other portions of their range. For bats that foraged extensively within the HCP boundary, the effect may be more severe. These bats will still have some foraging habitat available within the HCP boundary, but will likely have to expand their foraging range into previously unused areas to make up for the loss of foraging habitat. The impact of this on individual bats will vary. Recovery from the stress of hibernation and migration may be slower as the result of the added energy demands of searching for new foraging habitat; this may be particularly problematic for pregnant females. Pregnant females displaced from their preferred foraging range will have to expend energy to search for new areas; some may not be successful in producing young as the result. Females that do give birth may have pups with lower birth weights or their pups may have delayed development. This could in turn affect the

overwinter survival of the young-of-the-year bats if they enter fall migration and winter hibernation periods with inadequate fat reserves. Indiana bats may also experience higher rates of predation when searching for new foraging areas. Overall, the effect of the loss of foraging habitat on **individual** bats from the colony in the action area may range from no effect to death (e.g., as the result of exposure to predation or overwinter mortality of bats that have not stored adequate fat). The effect on the colony may be lost reproductive capacity and death of a small proportion of the colony. These effects are expected to be relatively short-lived; bats that survive the impacts of habitat loss will have found replacement foraging habitat within the second year after the habitat is lost within the HCP boundary.

Effects on Roosting Habitat

Indiana bats will also lose roosting habitat as the result of the proposed project, although these impacts are not expected to be as severe as the loss of foraging habitat. No known maternity roost trees will be lost as the result of this project. However, our knowledge of the roosting behavior of the colony is based on the roosting habits of radio-tagged bats, which represent a small percentage of the colony, so we cannot assume that all roost trees have been identified. There are suitable roost trees within the area to be cleared, and it is plausible that some of these trees may be used as alternate roosts by some members of the maternity colony. Although unlikely, we cannot eliminate the possibility that a primary maternity roost occurs within the area to be cleared. Further, adult male and non-reproductive female Indiana bats have not been radio tagged in the action area, but are known to inhabit the area; we cannot assess the roosting habits of this portion of the population. In summary, there is potential that currently used roosting habitat will be lost as the result of the proposed project. At a minimum, potential future roost trees will be lost as the result of the proposed activities. This will reduce the number of suitable roosts within the colony's traditional summer range. However, we know that the major roosting areas used by this colony, including all known primary maternity roosts, will not be cleared as the result of the proposed project. The major effect to roosting habitat is expected to be the loss of potential future roost sites, rather than immediate effects of lost roosting habitat.

Effects on Habitat Quality

In addition to direct habitat loss, proposed actions may result in a decrease in the quality of remaining habitat within HCP boundary. Factors that may lead to a loss in the quality of remaining habitat include: increased habitat fragmentation; increased human disturbance (more lighting associated with road improvements, increased traffic and associated noise); foraging habitat over relocated streams will be poor until the aquatic community becomes established; and water quality in the action area may be negatively impacted, at least in the short term during construction activities.

The loss of 139 of 247 ha of existing habitat inside the HCP boundary will result in increased fragmentation of the habitat available to Indiana bats in that area. However, because habitat to be lost is concentrated in the eastern portion of the project area, and the blocks of habitat that will be retained are concentrated in the western portion, the affect on the level of fragmentation will be minor. Over time, it is expected that fragmentation of habitat in the action area will decline, as the mitigation plantings

mature into suitable Indiana bat habitat.

Increased human disturbance in the project area may affect the quality of bat habitat, but these effects are expected to be relatively minor. Indiana bats in the action area have previously been exposed to high noise levels associated with aircraft overflights, as well as traffic on I-70. Similarly, these bats have also been exposed to artificial lights associated with roadway and airport lighting, as well as lights on vehicles. There will be increased lighting and increased noise levels in new locations (for example, associated with the new interchange on I-70) as the result of some of the roadway improvements. However, we expect that the loss of habitat associated with the proposed project, as opposed to increased lighting and noise, that will the major factor affecting habitat use by bats.

Insects associated with aquatic habitats make up part of the diet of Indiana bats; therefore, water quality can affect the prey base of the species. Water quality impacts that may result from the proposed project include the relocation of stream channels, increased sedimentation as the result of construction activities, and increased runoff (and associated pollutants) from newly constructed roadways. All relocated stream channels will be planted with hardwood seedlings, which are expected to stabilize the banks; eventually trees are expected to provide shade to the riparian corridor, a source of woody debris to provide in-stream habitat, and Indiana bat foraging cover. Until these newly relocated channels become established, they will not provide foraging habitat for Indiana bats. Coordination with the applicants is ongoing to insure that relocated stream channels produce viable aquatic systems. Aquatic communities will be monitored post-construction and remedial actions will be required if established criteria are not met. Erosion control plans, as discussed in the HCP, will be implemented during all construction activities. Properly implemented erosion control measures should alleviate short-term sedimentation impacts on the aquatic insect community. We do not have information that suggests that these water quality impacts will result in a long-term decline in the prey base available to Indiana bats in the project area. However, a short-term decline in insect production is possible, and may exacerbate the issue of lost foraging habitat in the project area.

Effects of Avoidance, Minimization and Mitigation Measures

The applicants have incorporated measures into the proposed project design to avoid, minimize and mitigate the impacts of the project to the extent practical. Avoidance, minimization and mitigation procedures are discussed in the Conservation Measures section of this document and are further detailed in the applicants' HCP. These measures include:

1. Seasonal Tree Cutting Restrictions;
2. Mitigation Plantings;
3. Permanent Protection of Existing Indiana Bat Habitat within the HCP Boundary;
4. Permanent Protection of Existing Indiana Bat Habitat Outside the HCP Boundary;
5. Purchase Additional Existing Indiana Bat Habitat;
6. Establish Buffers Around Protected Areas;
7. Training of Project Personnel;
8. Public Outreach on Indiana Bats; and

9. Monitoring and Research Program.

Cutting an Indiana bat roost tree when bats are present in the tree is likely to result in bats being injured or killed. The applicants will avoid killing or injuring roosting bats by removing trees in the HCP boundary between September 16 and April 14, when Indiana bats are not known to concentrate in roost trees.

To minimize impacts to bats due to habitat loss, 151 ha of existing forested habitat suitable for Indiana bat foraging and roosting in areas within the range of the Indiana bat maternity colony have been identified and will be protected in perpetuity for the primary purpose of Indiana bat conservation. Project applicants have also agreed to purchase and protect additional acreage that has not yet been identified. Silvicultural manipulation in these areas will be limited to activities which will enhance the quality of habitat for Indiana bats, as agreed on by the Service's BFO. Areas selected for permanent protection are generally of higher quality (i.e., more mature trees) than many of areas that will be cleared for the project. In addition, these areas were also selected specifically to provide larger forest blocks, to protect areas that provide connectivity among existing blocks of forested habitat, and to provide connectivity along the East Fork of White Lick Creek corridor. This riparian area is known to provide valuable habitat for Indiana bats, and also serves as a travel corridor for bats.

To mitigate for unavoidable impacts, 140 ha of hardwood seedlings will be planted and protected in perpetuity. The goal of the plantings is to enhance Indiana bat habitat in the long term by providing forested riparian habitat, improving connectivity among blocks of existing habitat, and creating larger blocks of forested bat habitat. The sites proposed for plantings are located to improve the connectivity of forested habitat within the range of the maternity colony, particularly along the corridor of the East Fork of White Lick Creek. Improved connectivity of habitat along the stream, and between the stream and other forested parcels, is expected to improve habitat conditions for Indiana bats. Permanently protected plantings along the stream corridor will also benefit water quality in the long term, as the plantings will provide a vegetated buffer that will reduce runoff, and associated sedimentation, from adjoining roadways, commercial/industrial developments, and agricultural areas. Seedling plantings are proposed both within the HCP boundary and within the IAA's Conservation Management Area (the applicants have also referred to this area as the "Sustained Mitigation Area" in some documents). The Conservation Management Area (which is mapped in Figure 12.1 of the HCP) is an area south of the HCP boundary that is heavily used by Indiana bats; therefore, proposed mitigation is concentrated in this area. Parcels owned by the IAA outside the Conservation Management Area may be considered for planting if it is determined by the Service that these parcels have exceptional potential to improve habitat connectivity for the Indiana bat colony that inhabits the area. In the long term, the plantings will provide a diverse woodland that is well stocked with species of trees that are known to provide Indiana bat roosting habitat. Plantings will be monitored to insure that at least 80% of the initial planting survives; if survival is below 80% five years after planting, then remedial measures will be taken. There will be no manipulation of vegetation in these areas without consultation with the Service's BFO.

Specifically with reference to the loss of foraging habitat, which will be the primary effect of the

proposed project on Indiana bats, we anticipate that the existing habitat that will be permanently protected as the result of this project, in addition to other habitat that is available to this colony, will provide adequate foraging habitat to allow the colony of bats to persist in the action area. In addition to protecting existing habitat, 140 ha of hardwood seedlings will be planted and permanently protected to enhance long-term foraging conditions for Indiana bats. Plantings will emphasize linking existing habitat patches and creating larger blocks of forested habitat. Existing habitat to be protected outside the HCP boundary and seedling plantings will be concentrated in the area south of the HCP boundary. Telemetry data have demonstrated that the area south of the HCP boundary is the most intensively used foraging area by the Indiana bat maternity colony. All of the nine Indiana bats radio tracked in 1999 were located in the mitigation areas south of the HCP boundary at some time; seven of the nine bats used these areas extensively. Concentration of mitigation in these intensely used foraging areas will help to alleviate the effects of the loss of foraging habitat within the HCP boundary in the short term. In the long term, we anticipate that these measures will result in better foraging conditions than currently exist in the action area.

An extensive monitoring and research program is also proposed by the applicants. The Indiana bat colony in the action area would be studied for 15 years, beginning with the first summer following the start of construction. The details of the proposed monitoring plan were developed in consultation with the Service and are provided in the applicants' HCP. As previously noted, the colony in the vicinity of the project area has been studied since 1994; this is the longest that any single colony of Indiana bats has ever been studied. The baseline data that are available on this colony, in conjunction with the data that would be collected through the applicants' monitoring program, will allow the Service to thoroughly evaluate the response of bats to the disturbance which will occur in the project area as well as the mitigation measures that are implemented. This will be the first time that information of this magnitude has been collected over the long term on an Indiana bat colony. The information collected through this monitoring program will make a significant contribution to our understanding of Indiana bats and it is hoped will make a contribution to the recovery of the species. The applicants will also work with the Service's BFO to develop and implement an outreach program to educate the public regarding the Indiana bat. The Indiana bat recovery plan (USFWS 1983) identifies public education on Indiana bats as a priority activity needed for recovery of the species. The presence of this Indiana bat maternity colony in close proximity to the Indianapolis metropolitan area provides a unique opportunity for public outreach programs on the species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation pursuant to section 7 of the Act.

The total area included in the HCP boundary is approximately 1,448 hectares (ha); 247 ha are classified as bat habitat. Areas classified as bat habitat are primarily forested areas, wooded pasture,

or open areas with scattered trees. As a result of the proposed project, it is anticipated that 139 ha of this habitat will be permanently lost, and the applicants' HCP considers the effects of this habitat loss. An additional 71 ha of habitat will be protected in perpetuity, as detailed in the HCP. The remaining 37 hectares of Indiana bat habitat within the HCP boundary is on privately owned land. Those parcels are not controlled by the HCP applicants and the proposed project does not involve any impacts to Indiana bats on those parcels. We are unaware of any current development plans on these parcels. If in the future these parcels are developed, consultation pursuant to section 10 of the Act will be conducted if appropriate.

Outside the HCP boundary, but within the range of the Indiana bat maternity colony, development is occurring rapidly. Models developed for the Environmental Assessment for the Six Points Road Interchange (American Consulting Engineers, Inc. 1995) indicated that development in the area surrounding the project area would occur at a rate of 33 ha per year during the years immediately following the project. Even though only a small portion of the landscape in the surrounding area is forested, this continued development will lead to additional habitat loss for Indiana bats. We anticipate decline in bat habitat over a wide area outside the HCP boundary in the future, although we are not aware of specific development plans in known bat habitat at this time. As we become aware of specific projects, impacts to Indiana bats will be addressed through the incidental take permit process, if appropriate.

Implementation of the HCP would alleviate the cumulative effects of development on the Indiana bat maternity colony. For the colony to persist in light of increasing pressure for development in the area surrounding the Indianapolis International Airport, habitat must be permanently protected within the range of the colony. The 151 ha of existing habitat that would be protected under the HCP provide habitat and travel corridors for Indiana bats. Areas set aside for mitigation plantings will protect those areas from development in the short term, and in the long term will provide quality roosting and foraging habitat. These areas will also help to decrease habitat fragmentation, and to improve the potential that the colony of Indiana bats currently using the action area could expand into suitable habitat further south. With implementation of the HCP, we anticipate that long-term habitat conditions for the Indiana bat colony in the area would be better than existing conditions.

CONCLUSION

After reviewing the current status of Indiana bat, the environmental baseline for the action area, the effects of the proposed highway construction and associated development, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the Indiana bat. Critical habitat for this species has been designated at two locations in Indiana, however, this action does not affect either area and no destruction or adverse modification of that critical habitat is anticipated.

In summary, there will be a short-term net loss of Indiana bat habitat associated with this project which is expected to result in take of individuals bats, but we anticipate that the colony will be able to persist

in the action area if avoidance, minimization, and mitigation measures as proposed in the HCP are fully implemented. Habitat quality in areas set aside for bat conservation should gradually increase. Over time, a large portion of the Conservation Management Area and adjoining forested areas which will be preserved in perpetuity are anticipated to result in a net benefit to Indiana bats in the action area as compared to current conditions. The immediate value of the mitigation plantings to bats include: 1) to provide areas that would not be cleared for development that link existing habitat patches; and 2) to protect water quality by protecting riparian areas from development. In the long term, we anticipate that the mitigation plantings will develop into quality roosting and foraging habitat for Indiana bats. It is expected that hardwood seedling plantings may provide limited roosting habitat in approximately 25 years, and the plantings may provide limited foraging habitat much sooner. Within 50 years, the plantings are expected to provide good quality roosting habitat. Compared to current baseline conditions, there will be more forested habitat, a larger block of contiguous habitat, greater connectivity among habitat patches, and improved habitat conditions along the riparian corridors. All of these habitat trends should be beneficial to Indiana bats. Both hardwood seedling plantings and existing bat habitat that is set aside under the HCP will be protected in perpetuity. This permanent protection is particularly crucial because future opportunities for bat conservation within the range of this colony are limited. These permanently protected parcels will be the largest block of habitat available to Indiana bats, as well as other species of forest wildlife, over a large geographic area.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The proposed Habitat Conservation Plan for the Six Points Road Interchange and Associated Development and its associated documents identify anticipated impacts to Indiana bats likely to result from the proposed taking and the measures that are necessary and appropriate to minimize those impacts. All conservation measures described in the proposed HCP, together with the terms and conditions described in the associated Implementing Agreement and the section 10(a)(1)(B) permit issued with respect to the proposed HCP, are hereby incorporated by reference as reasonable and

prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR §402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the Act to apply. If the permittee fails to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed HCP, associated reporting requirements, and provisions for disposition of dead or injured animals are as described in the HCP and/or its accompanying section 10(a)(1)(B) permit.

AMOUNT OR EXTENT OF TAKE

Based on the proposed HCP and on the analysis of the effects of the proposed action, the Service anticipates that a maternity colony of Indiana bats, which was estimated to number 146 reproductive females and young in 1999, as well as an unquantifiable number of male and nonreproductive female adult bats which occupy the action area but do not occupy the primary maternity roost tree(s), may be impacted as the result of the proposed project and the Service's issuance of a 10(a)(1)(B) permit. The effect of the loss of foraging habitat is expected to result in the death of some bats (e.g., as the result of exposure to predation or overwinter mortality of bats that have not stored adequate fat). Loss of roosting habitat and degradation of remaining habitat may also result in harm of individual bats; while these effects are not expected to result directly in the death of bats, they may exacerbate the effect of loss of foraging habitat. Collectively, the effects of the action are expected to result in behavioral or physiological effects which impair reproduction and recruitment, or other essential behavioral patterns. Death of individuals, decreased fitness of individuals, reduced reproductive potential, and reduced overwinter survival of some members of the colony may result. The effect on the colony may be lost reproductive capacity and potentially a short-term decline in the size of the colony.

It is unlikely that direct mortality of bats will be detected, that is, we do not expect that dead or moribund bats will be found, even though we expect that some portion of the colony may die as result of the proposed actions. In fact, there is no practical means to directly measure the level of take that will occur. Therefore, the anticipated level of take is expressed as the permanent loss of 139 ha of roosting and foraging habitat; the exact location of habitat to be impacted is mapped in the proposed HCP.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The FHWA must fulfill all obligations, as a member of the Interagency Task Force, to implement conservation measures described in Section 12.0 of the HCP, Minimizing and Mitigating Impact to

Indiana Bats, and Section 13.0, Indiana Bat Section 404/401 Monitoring. These measures are hereby incorporated by reference.

The Service believes that all measures proposed are necessary and appropriate to minimize take of Indiana bats. Upon issuing the incidental take permit, the Service will take the necessary steps to ensure that the HCP applicants complete all conservation measures.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Service and the FHWA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The Service must ensure that the conservation measures proposed in the HCP are fully implemented by the Interagency Task Force proposing this project. The Service will, through enforceable terms and conditions within the incidental take permit, ensure that the Interagency Task Force is aware of their responsibilities and liabilities to fully implement the conservation measures detailed in their HCP. The Service will participate in field reviews, as appropriate, to evaluate and verify permit compliance. The Service has developed a compliance checklist (attached as Appendix I) which will be completed by April 1 (following each monitoring year) to provide documentation that the Service is monitoring compliance of the task force to obligations made in the HCP. This checklist will be completed for the 15-year period during which the HCP and associated incidental take permit will be valid.

The Service will also verify that deed restrictions for protected parcels are in place within 90 days of the issuance of the incidental take permit and ensure that project personnel are aware of procedures for disposition of injured and dead bats (as provided in the HCP).

The FHWA, as a member of the Interagency Task Force, must fulfill its obligations to implement the HCP and accompanying Implementing Agreement. These obligations include:

1. The Interagency Task force must implement all conservation measures, as detailed in Section 12.0 of the HCP and monitoring and reporting requirements as detailed in Section 13.0 of the HCP.

2. As detailed in the HCP, representatives of the Service, the COE, the Indiana Department of Environmental Management, and the Indiana Department of Natural Resources will be granted access to all mitigation and permanently protected areas for monitoring purposes upon appropriate notification and approval by the Indianapolis Airport Authority (or other managing agency properly assigned in accordance with provisions of the HCP).

3. Deed restrictions for all parcels to be held in perpetuity should be in place within 90 days of the issuance of the incidental take permit. (Except for parcels which are acquired by the Interagency Task Force after the issuance of this biological opinion and subsequently held in perpetuity, as discussed in the HCP).

4. Any dead bats located on the action area during construction, mitigation, or monitoring activities, regardless of species, should be immediately reported to BFO [(812) 334-4261], and subsequently transported on ice to that office. No one, with the exception of researchers contracted to conduct bat monitoring activities, should attempt to handle any live bat, regardless of its condition; report bats that appear to be sick or injured to BFO. BFO will make a species determination on any dead or moribund bats. If an Indiana bat is identified, BFO will contact the appropriate Service Law Enforcement office. This information on the disposition of dead bats should be incorporated into instructions provided to project personnel and included in the "Construction Specifications" as discussed in Section 12.0 of the HCP.

In conclusion, the Service believes that no more than 139 ha of habitat, that is currently suitable summer roosting and foraging habitat for Indiana bats, will be permanently lost within the HCP boundary. This take may occur over a total of 15 years, beginning in the first year of construction. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded (i.e. more than the 139 ha designated in the HCP is cleared, or clearing occurs during the period April 15-September 15 in any given year), such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The FHWA in conjunction with other members of the Interagency Task Force must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service provides the following conservation recommendations for FHWA; these activities may be conducted at the discretion of FHWA as time and funding allow:

1. Working with the Service, develop guidelines for addressing Indiana bat issues associated with FHWA projects in the Midwest.

2. Expand on educational and outreach efforts on Indiana bats that will be developed by the Interagency Task Force.

In order for the Service to be kept informed of actions for minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation with FHWA on the construction of the Six Points Road interchange and associated development and the formal intra-Service consultation on the issuance of an incidental take permit to the applicants. As a basis for this permit action, the applicants submitted the required HCP requesting an incidental take permit for Indiana bats in the project area. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals that the issuance of an incidental take permit may affect listed species in a manner or to an extent not considered in this opinion; (3) the highway construction and associated development are subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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APPENDIX I

USFWS BLOOMINGTON FIELD OFFICE
Annual Compliance Checklist
for the
Habitat Conservation Plan for the Six Points Road Interchange and Associated Development

Compliance checklist for the year _____. Explanations are attached for any activity that was not in compliance with the HCP and associated incidental take permit.

TREE CLEARING ACTIVITIES (Permit allows for the clearing of a total of 139 ha of habitat)

How many ha of bat habitat, as defined in the HCP, were cleared this year?

Total clearing that has occurred under this incidental take permit to date.

Did all clearing occur between September 16-April 14?

TREE PLANTING (Permit requires planting 140 ha of tree seedlings over a five-year period)

How many ha of seedlings were planted this year?

Total ha planted under this incidental take permit to date.

Did all planting this year comply with standards established in the HCP?

Was the annual report on vegetation monitoring received by March 1 (of the year following the monitoring)?

Was the report complete and in compliance with standards established in the HCP?

INDIANA BAT MIST NET SURVEY (required for a total of 15 years)

A bat mist net survey is required every year, with an extensive survey required during the first year of construction and every other year thereafter through year 15 of the HCP.
Extensive mist net surveys will be conducted in 2002 and every even year through 2016. Limited mist net surveys will be conducted in 2003 and every odd year through 2015. Complete the appropriate section **Extensive Mist Net Survey** or **Limited Mist Net Survey**.

Extensive Mist Net Survey

Was mist netting conducted for four net nights at each of the 10 stream sites approved by the USFWS?

Was mist netting also conducted in the vicinity of each primary roost tree (this is only required if netting at the stream sites does not result in the capture of at least 2 Indiana bats per month during the May 15-August 15 field season)?

Were a minimum of 2 Indiana bats per month captured and radio tracked each month of the field season using the standards established in the HCP?

Limited Mist Net Survey

Was mist netting conducted monthly during the May 15-August 15 field season in the vicinity of each primary roost tree?

Were a minimum of 2 Indiana bats per month captured and radio tracked each month of the field season using the standards established in the HCP?

ROOST TREE MONITORING/EMERGENCE COUNTS (conducted every year for 15 years)

Were emergence counts conducted at primary roost trees at least twice weekly from March 15 until documented departure of the Indiana bats in the fall? (If only 1 primary roost tree location was known, the tree should have been monitored twice weekly. If the location of 2 or more primary roost trees was known, emergence counts should have been conducted at least once weekly at all primary roost trees simultaneously).

Was information on characteristics of all known roosts, their location, and site-specific data relative the roost area collected according to standards established in the HCP?

INDIANA BAT SURVEY AND ROOST TREE MONITORING REPORT

Was the annual report on Indiana bat monitoring received by March 1 (of the year following the monitoring)?
Was the report complete and in compliance with standards established in the HCP?
Was all data made available for review and/or analysis by the Service (if requested)?
Was a field review of the area conducted this year?
If yes, what was the date of the review and who participated?

NOTES OR COMMENTS

Compliance checklist completed by:
Date: